

Table of Contents

	Page
Acronyms and Abbreviations	x
Glossary	xii
CHAPTER 1	
1.1	SUMMARY 1-1
1.1.1	INTRODUCTION 1-1
1.1.1.1	King County Action 1-2
1.2	CHANGES BETWEEN DEIS AND FEIS 1-2
1.3	SUMMARY OF THE PROPOSAL AND ALTERNATIVES 1-4
1.3.1	Alternative 1—No Action 1-5
1.3.2	Alternative 2—Proposal: Lower and Upper Sites Mining - Exit 34 1-5
1.3.3	Alternative 2A—Upper Site Mining and Limited Lower Site Mining - Exit 34 1-6
1.3.4	Alternative 3—Lower and Upper Sites Mining - Exits 34 and 38 1-6
1.3.5	Alternative 3A—Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38 1-7
1.3.6	Alternative 4—Upper Site Mining - Exit 38 1-7
1.4	SIGNIFICANT AREAS OF CONTROVERSY 1-7
1.5	IMPACTS AND MITIGATION MEASURES 1-8
1.6	PHASED REVIEW 1-9
CHAPTER 2	
2.1	PROPOSAL AND ALTERNATIVES 2-1
2.1.1	BACKGROUND OF THE PROPOSAL 2-1
2.1.1.1	Site Location and Vicinity Description 2-2
2.1.1.2	Grading Permit Application and SEPA Process 2-2
2.1.1.3	Proposal Objectives 2-3
2.2	DESCRIPTION OF PROPOSAL 2-4
2.2.1	Alternative 2—Proposal: Lower and Upper Sites Mining - Exit 34 2-4
2.2.2	General Project Description 2-4
2.3	DEVELOPMENT OF ALTERNATIVES TO THE PROPOSAL 2-20
2.4	DESCRIPTION OF ALTERNATIVES TO THE PROPOSAL 2-21
2.4.1	Alternative 1—No Action 2-22
2.4.2	Alternative 2A—Upper Site Mining and Limited Lower Site Mining - Exit 34 2-22
2.4.3	Alternative 3—Lower and Upper Sites Mining - Exits 34 and 38 2-22
2.4.4	Alternative 3A—Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38 2-23
2.4.5	Alternative 4—Upper Site Mining - Exit 38 2-23
2.5	ALTERNATIVES CONSIDERED BUT NOT ADVANCED 2-24
2.5.1	Exit 38/Homestead 2-24
2.5.2	Exit 38/WDNR 2-25
2.6	BENEFITS AND DISADVANTAGES OF DELAYING IMPLEMENTATION OF THE PROPOSAL 2-25
CHAPTER 3	
3.1	SOILS AND GEOLOGY 3-1
3.1.1	EXISTING CONDITIONS 3-1
3.1.1.1	Topography 3-1
3.1.1.2	Regional Geologic Setting 3-1
3.1.1.3	Site Geology 3-2
3.1.1.4	Geologically Hazardous Areas 3-3
3.1.1.5	Seismic Hazards 3-3

3.2	ENVIRONMENTAL IMPACTS.....	3-4
3.2.1	Construction Impacts.....	3-4
3.2.2	Operation Impacts	3-8
3.2.3	Cumulative Impacts	3-9
3.3	MITIGATION MEASURES	3-9
3.3.1	Alternative 1—No Action	3-9
3.3.2	Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	3-10
3.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	3-11
CHAPTER 4	AIR QUALITY	4-1
4.1	EXISTING CONDITIONS	4-1
4.1.1	Regional Climate and Meteorology	4-2
4.1.2	Local Air Quality	4-2
4.2	ENVIRONMENTAL IMPACTS.....	4-6
4.2.1	Construction Impacts.....	4-7
4.2.2	Operation Impacts	4-9
4.2.3	Cumulative Impacts	4-14
4.3	MITIGATION MEASURES	4-14
4.3.1	Alternative 1—No Action	4-14
4.3.2	Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	4-14
4.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	4-16
CHAPTER 5	NOISE.....	5-1
5.1	EXISTING CONDITIONS	5-1
5.1.1	Definition of Noise and How it is Measured.....	5-1
5.1.2	Regulation of Noise	5-2
5.1.3	Background Noise Levels.....	5-4
5.2	ENVIRONMENTAL IMPACTS.....	5-5
5.2.1	Construction Impacts.....	5-6
5.2.2	Operation Impacts	5-7
5.2.3	Cumulative Impacts	5-12
5.3	MITIGATION MEASURES	5-14
5.3.1	Alternative 1—No Action	5-14
5.3.2	Alternatives 2 (Including Limited Lower Site Mining)	5-14
5.3.3	Alternative 3—Lower and Upper Site Mining (Including Limited Lower Site Mining).....	5-15
5.3.4	Alternative 4—Upper Site Mining – Exit 38	5-15
5.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	5-16
CHAPTER 6	WATER.....	6-1
6.1	EXISTING CONDITIONS	6-1
6.1.1	Regional Surface Water	6-1
6.1.2	Site Surface Water	6-3
6.1.3	Regional Groundwater.....	6-5
6.1.4	Water Budget.....	6-12
6.2	ENVIRONMENTAL IMPACTS.....	6-14
6.2.1	Construction Impacts.....	6-14
6.2.2	Operation Impacts	6-15
6.2.3	Cumulative Impacts	6-29
6.3	MITIGATION MEASURES	6-30
6.3.1	Alternative 1—No Action	6-30
6.3.2	Alternative 2—Proposal: Lower and Upper Sites Mining (Including Limited Lower Site Mining)	6-31
6.3.3	Alternative 3—Lower and Upper Sites Mining (Including Limited Lower Site Mining).....	6-35
6.3.4	Alternative 4—Upper Site Mining - Exit 38.....	6-35

6.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	6-36
CHAPTER 7	PLANTS AND ANIMALS	7-1
7.1	EXISTING CONDITIONS	7-1
7.1.1	Wildlife Habitat.....	7-1
7.1.2	Streams and Aquatic Habitat.....	7-3
7.1.3	Wetlands.....	7-5
7.1.4	Potentially Affected Wildlife Species	7-7
7.1.5	Potentially Affected Fish	7-9
7.1.6	Potentially Affected Threatened and Endangered Species.....	7-10
7.2	ENVIRONMENTAL IMPACTS.....	7-11
7.2.1	Construction and Operation Impacts.....	7-12
7.2.2	Cumulative Impacts	7-16
7.3	MITIGATION MEASURES	7-18
7.3.1	Alternative 1-No Action	7-18
7.3.2	Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	7-18
7.3.3	Alternatives 3 and 4 (Including Limited Lower Site Mining)	7-20
7.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	7-21
7.4.1	Alternative 1-No Action	7-21
7.4.2	Alternative 2—Proposal: Lower and Upper Sites Mining (Including Limited Lower Site Mining)	7-21
7.4.3	Alternative 3—Lower and Upper Sites Mining (Including Limited Lower Site Mining).....	7-21
7.4.4	Alternative 4—Upper Site Mining - Exit 38.....	7-22
CHAPTER 8	ENERGY	8-1
8.1	EXISTING CONDITIONS	8-1
8.1.1	Electrical Use and Supply.....	8-1
8.1.2	Fuel Use and Supply	8-1
8.1.3	Natural Gas Use and Supply.....	8-2
8.2	ENVIRONMENTAL IMPACTS.....	8-2
8.2.1	Construction Impacts.....	8-2
8.2.2	Operation Impacts	8-3
8.2.3	Cumulative Impacts	8-8
8.3	MITIGATION MEASURES	8-8
8.3.1	Alternative 1—No Action	8-8
8.3.2	Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	8-8
8.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	8-9
CHAPTER 9	LAND USE.....	9-1
9.1	EXISTING CONDITIONS	9-1
9.1.1	Project Site	9-1
9.1.2	Site Vicinity	9-2
9.1.3	Existing Land Use Designations.....	9-4
9.1.4	Density and Distribution of Residences.....	9-5
9.2	ENVIRONMENTAL IMPACTS.....	9-7
9.2.1	Construction Impacts.....	9-7
9.2.2	Operation Impacts	9-8
9.2.3	Cumulative Impacts	9-16
9.3	MITIGATION MEASURES	9-16
9.3.1	Alternative 1—No Action	9-16
9.3.2	Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	9-16
9.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	9-17
CHAPTER 10	HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES	10-1
10.1	EXISTING CONDITIONS	10-1
10.1.1	Prehistory.....	10-1
10.1.2	Ethnography	10-1
10.1.3	History 10-2	

10.2	10.1.4 Survey Results	10-3
	ENVIRONMENTAL IMPACTS.....	10-4
	10.2.1 Construction and Operation Impacts.....	10-4
	10.2.2 Cumulative Impacts	10-4
10.3	MITIGATION MEASURES	10-4
	10.3.1 Alternative 1—No Action	10-4
	10.3.2 Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	10-4
10.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	10-5
CHAPTER 11	RECREATION.....	11-1
11.1	EXISTING CONDITIONS	11-1
	11.1.1 Recreational Features in the Vicinity.....	11-1
	11.1.2 Planned Acquisitions and Improvements	11-4
11.2	ENVIRONMENTAL IMPACTS.....	11-4
	11.2.1 Construction Impacts.....	11-4
	11.2.2 Operation Impacts	11-6
	11.2.3 Cumulative Impacts	11-9
11.3	MITIGATION MEASURES	11-10
11.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	11-10
CHAPTER 12	AESTHETICS, LIGHT, AND GLARE	12-1
12.1	EXISTING CONDITIONS	12-1
	12.1.1 Aesthetics	12-1
	12.1.2 Light and Glare	12-4
12.2	ENVIRONMENTAL IMPACTS.....	12-6
	12.2.1 Construction Impacts.....	12-6
	12.2.2 Operation Impacts	12-7
	12.2.3 Cumulative Impacts	12-16
12.3	MITIGATION MEASURES	12-16
12.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	12-17
CHAPTER 13	PUBLIC SERVICES AND UTILITIES.....	13-1
13.1	EXISTING CONDITIONS	13-1
	13.1.1 Public Services	13-1
	13.1.2 Utilities 13-2	
13.2	ENVIRONMENTAL IMPACTS.....	13-3
	13.2.1 Construction Impacts.....	13-3
	13.2.2 Operation Impacts	13-4
	13.2.3 Cumulative Impacts	13-7
13.3	MITIGATION MEASURES	13-7
	13.3.1 Alternative 1—No Action	13-7
	13.3.2 Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)	13-7
13.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	13-9
CHAPTER 14	TRANSPORTATION.....	14-1
14.1	EXISTING CONDITIONS	14-1
	14.1.1 Highway and Street Systems	14-1
	14.1.2 Traffic Volumes.....	14-5
	14.1.3 Level of Service (LOS)	14-7
	14.1.4 Accident History.....	14-11
14.2	PEDESTRIAN AND BICYCLE FACILITIES	14-11
	14.2.1 School Transportation	14-12
	14.2.2 Interstate 90 Closures	14-12
	14.2.3 Traffic Operation.....	14-13
14.3	ENVIRONMENTAL IMPACTS.....	14-14
	14.3.1 Construction Impacts.....	14-14
	14.3.2 Operation Impacts	14-15
	14.3.3 Cumulative Impacts	14-33

14.4	MITIGATION MEASURES	14-34
14.4.1	Alternative 1–No Action	14-34
14.4.2	Alternative 2–Lower and Upper Sites Mining (Including Limited Lower Site Mining).....	14-34
14.4.3	Alternative 3–Lower and Upper Sites Mining (Including Limited Lower Site Mining).....	14-41
14.4.4	Alternative 4–Upper Site Mining - Exit 38.....	14-42
14.5	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	14-42
CHAPTER 15	ENVIRONMENTAL HEALTH	15-1
15.1	EXISTING CONDITIONS	15-1
15.2	ENVIRONMENTAL IMPACTS.....	15-1
15.2.1	Construction Impacts.....	15-1
15.2.2	Operation Impacts	15-2
15.2.3	Cumulative Impacts	15-8
15.3	MITIGATION MEASURES	15-8
15.3.1	Alternative 1–No Action	15-8
15.3.2	Alternatives 2 and 3 (Including Limited Lower Site Mining)	15-8
15.3.3	Alternative 4–Upper Site Mining - Exit 38.....	15-9
15.4	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS.....	15-10
CHAPTER 16	REFERENCES.....	16-1

List of Preparers

FEIS Distribution list

TABLES

Table 1-1	Comparison of Alternatives	1-4
Table 1-2	Summary of Impacts	1-11
Table 2-1	Phasing Activities	2-10
Table 2-2	Estimating Phasing Schedule.....	2-11
Table 2-3	Alternative 2—Proposed Water Use	2-14
Table 2-4	Elevations of Proposed Site Structures and Features	2-16
Table 2-5	Materials Storage and Handling Features	2-18
Table 2-6	Comparison of Alternatives	2-21
Table 4-1	Emission Inventory for the Proposal at Peak Production (Emissions in Pounds Per Day and Tons Per Year)	4-7
Table 4-2	Maximum PM ₁₀ Concentrations (in Micrograms/Cubic Meter)	4-10
Table 4-3	Summary of Asphalt Plant Sources of Emissions	4-11
Table 4-4	Asphalt Plant Modeled Concentrations.....	4-12
Table 4-5	Project-Generated Truck Emission Impacts	4-13
Table 4-6	Cumulative PM ₁₀ Impacts	4-14
Table 5-1	A-Weighted Sound Levels and Human Response.....	5-2
Table 5-2	Maximum Permissible Sound Levels (in dBA)	5-3
Table 5-3	24-Hour Noise Monitoring Sites.....	5-4
Table 5-4	Measured Noise Levels (in dBA)	5-5
Table 5-5	Project-Generated Noise Sources Noise Levels 50 Feet from Source.....	5-6
Table 5-6	Peak Production Noise Levels (in dBA Leq) Inversion and High Wind Speed Meteorological Conditions All Onsite Equipment and Trucks	5-9
Table 5-7	Noise Levels and Impacts of Offsite Truck Traffic (in dBA Leq) Alternatives 2, 3, and 4 Peak Production (2025)	5-10
Table 5-8	Cumulative Noise Impacts Peak Production in 2025 (in dBA Leq).....	5-13
Table 6-1	Spring Discharge Measurements	6-4
Table 6-2	Water Supply Wells Within a 1-Mile Radius of the Site.....	6-7
Table 6-3	Annual Water Budget - Lower and Upper Sites	6-12
Table 7-1	Existing Vegetation Cover-Type Areas (acres).....	7-2
Table 7-2	Stream Crossings on SE Grouse Ridge Road	7-4
Table 12-1	Light Level Measurements in Proposed Project Area	12-5
Table 12-2	Light Level Measurements at Sky River Facility (Monroe, Washington)	12-12
Table 14-1	Existing Roadway Characteristics	14-2
Table 14-2	Trip Generation for 2005 Projects	14-5
Table 14-3	Traffic Data Collection Locations	14-6
Table 14-4	Existing Peak-Hour Level of Service Summary	14-9
Table 14-5	Weather-Related Closures of Eastbound I-90 (1995 to 1998)	14-13
Table 14-6	No Action AM Peak-Hour Level of Service Summary	14-16
Table 14-7	No Action PM Peak-Hour Level of Service Summary	14-17
Table 14-8	Alternative 2 Project Trip Generation (Proposal)	14-20
Table 14-9	Alternative 2 AM Peak-Hour Level of Service Summary	14-21
Table 14-10	Alternative 2 PM Peak-Hour Level of Service Summary	14-22
Table 14-11	Alternative 2 AM Peak-Hour Level of Service Comparison	14-22
Table 14-12	Alternative 2 PM Peak-Hour Level of Service Comparison	14-23
Table 14-13	Project Trip Generation (Alternative 3)	14-26
Table 14-14	Alternative 3 AM Peak-Hour Level of Service Summary	14-27
Table 14-15	Alternative 3 PM Peak-Hour Level of Service Summary	14-27
Table 14-16	Alternative 3 AM Peak-Hour Level of Service Comparison	14-28
Table 14-17	Alternative 3 PM Peak-Hour Level of Service Comparison	14-28
Table 14-18	Alternative 4 Project Trip Generation.....	14-32

Table 14-19	Scenario 4 AM Peak-Hour Level of Service Summary Mitigation on Alternative 2 including TWLTL and signal at I-90 EB Ramps.....	14-35
Table 14-20	Scenario 4 PM Peak-Hour Level of Service Summary Mitigation on Alternative 2 including TWLTL and signal at I-90 EB Ramps.....	14-36
Table 14-21	Scenario 5 AM Peak-Hour Level of Service Summary Mitigation on Alternative 2 including TWLTL and signals at I-90 EB Ramps and 146th Street.....	14-37
Table 14-22	Scenario 5 PM Peak-Hour Level of Service Summary Mitigation on Alternative 2 including TWLTL and signals at I-90 EB Ramps and 146th Street.....	14-38
Table 15-1	Metal Concentrations in GroCo and King County Biosolids Compared to Regulatory Limits	15-6

FIGURES

- Figure 1-1 Project Vicinity
Figure 1-2 North Bend Gravel Operation Study Area
- Figure 2-1 Project Vicinity
Figure 2-2 North Bend Gravel Operation Study Area
Figure 2-3 Alternative 2—Proposal: Lower and Upper Sites Mining - Exit 34
Figure 2-4 Cross Sections: Alternative 2 Proposal - Exit 34
Figure 2-5 Alternative 2—Gravel Mine Sequencing—Phase 1
Figure 2-6 Alternative 2—Gravel Mine Sequencing—Phase 2
Figure 2-7 Alternative 2—Gravel Mine Sequencing—Phase 3
Figure 2-8 Alternative 2—Gravel Mine Sequencing—Phase 4
Figure 2-9 Alternative 2—Gravel Mine Sequencing—Phase 5
Figure 2-10 Alternative 2—Gravel Mine Sequencing—Phase 6
Figure 2-11 Alternative 2—Gravel Mine Sequencing—Phase 7
Figure 2-12 Alternative 2—Gravel Mine Sequencing—Phase 8
Figure 2-13 Alternative 2—Gravel Mine Sequencing—Phase 9
Figure 2-14 Alternative 2—Gravel Mine Sequencing—Phase 10
Figure 2-15 Alternative 2—Gravel Mine Sequencing—Phase 11
Figure 2-16 Alternative 1—No Action
Figure 2-17 Alternative 2A—Upper Site Mining and Limited Lower Site Mining - Exit 34
Figure 2-18 Cross Sections: Alternative 2A—Upper Site Mining and Limited Lower Site Mining - Exit 34
Figure 2-19 Alternative 3—Lower and Upper Sites Mining - Exits 34 and 38
Figure 2-20 Cross Sections: Alternative 3—Lower and Upper Sites Mining - Exit 34 and 38
Figure 2-21 Alternative 3A—Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38
Figure 2-22 Cross Sections: Alternative 3A—Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38
Figure 2-23 Alternative 4—Upper Site Mining - Exit 38
Figure 2-24 Cross Sections: Alternative 4—Upper Site Mining - Exit 38
- Figure 3-1 Boring Locations and Proposed Final Elevation of Gravel Operation
Figure 3-2 Ridge Conveyor and Maintenance Road
- Figure 5-1 Noise Measurement Sites
- Figure 6-1 Study Area
Figure 6-2 Upper Site Spring Location Map
Figure 6-3 Groundwater Elevation Contour Map, January 1998
Figure 6-4 Sallal Well No. 3 Wellhead Protection Area
Figure 6-5 Boring Locations and Final Elevation of Gravel Operation
Figure 6-6 Generalized Geologic Cross Section A-A' Lower Site
Figure 6-7 Groundwater Elevations—Lower Site
Figure 6-8 Conceptual Hydrogeologic Model—Lower Site
Figure 6-9 Generalized Cross Section B-B', Upper Site
Figure 6-10 Generalized Cross Section C-C', Upper Site
Figure 6-11 Groundwater Elevations—Upper Site
Figure 6-12 Conceptual Hydrogeologic Model—Upper Site
Figure 6-13 Water Level Contour Map, Shallow Perching Zone—Upper Site
Figure 6-14 Water Level Contour Map, Deep Perching Zone—Upper Site

- Figure 7-1A Existing Conditions - Vegetation, Lower Site
 Figure 7-1B Existing Conditions - Vegetation, Upper Site
 Figure 7-1C Existing Conditions - Vegetation, SE Grouse Ridge Road
 Figure 7-1D Existing Conditions - Vegetation, SE Grouse Ridge Road
 Figure 7-2A Vegetation Cover - Types
 Figure 7-2B Vegetation Cover - Types
 Figure 7-3 Fish Bearing and Non-Fish Bearing Streams in the Vicinity of the Upper Site
 Figure 7-4 Wetland and Stream Locations Along SE Grouse Ridge Road
 Figure 7-5 Existing Wetland Location, Lower Site
- Figure 8-1 Energy Analysis Study Area
- Figure 9-1 Project Vicinity Aerial Photograph
 Figure 9-2 Area Zoning Map
- Figure 11-1 Existing Recreational Areas
- Figure 12-1 Visualization Viewpoints
 Figure 12-2 Mount Si—Alternative 2, Phase 10
 Figure 12-3 Hahn Residence—Alternative 2, Phase 1
 Figure 12-4 Lu Residence 1—Alternative 2, Phase 6
 Figure 12-5 Lu Residence 2—Alternative 2, Phase 1
 Figure 12-6 Lu Residence 3—Alternative 2, Phase 6
 Figure 12-7 Mailbox Peak—Alternative 2, Phase 10
 Figure 12-8 Conveyor Frontview—Alternative 2, Phase 6
 Figure 12-9 Lu Residence 1 Vegetation Growth—Alternative 2, Year 1
 Figure 12-10 Mount Si—Alternative 2A, Phase 10
 Figure 12-11 Mount Si—Alternative 3, Phase 1
 Figure 12-12 Lu Residence 1—Alternative 3, Phase 1
 Figure 12-13 Lu Residence 3—Alternative 3, Phase 6
 Figure 12-14 Mount Si—Alternative 4, Phase 10
- Figure 13-1 Public Utility Lines Within Study Area
- Figure 14-1 Study Area Street and Freeway System
 Figure 14-2 468th Avenue SE Lower Site Access
 Figure 14-3 Diagram of Typical Truck/Trailer Combinations
 Figure 14-4 Diagram of Typical Belly Dump Truck
 Figure 14-5 Existing Peak Hour Traffic Volumes
 Figure 14-6 Frequency and Duration of Winter I-90 Closures (1995 - 1998)
 Figure 14-7 Exits 34 Project-Generated Vehicles, Alternative 2
 Figure 14-8 Future (2005) Traffic Volumes by Time of Day
 Figure 14-9 Exit 34 Project-Generated, Alternative 3
 Figure 14-10 SE Grouse Ridge Road Sketch